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tifully carved and decorated houses, formed a fascinating subject for observation and photography. This central portion of Sumatra is thought to have been the original home of the Malay race. It is now well under Dutch control, and is covered with almost perfect roads, many of them dating from the English occupation of the island, roads which can not be paralleled in any State in the Union. At the north of the island, at Atjeh, the brave and capable Malays have been at continuous warfare with either the English or the Dutch for nearly one hundred years, and only thirty miles inland from Solok one finds the boundaries of the independent native states, to many of which no white man is admitted.

Aside from two weeks spent at Manila, our long trip home was without special interest, and we were very glad to disembark from the U. S. A. T. "Indiana" after nearly six months absence.

The camps of the various expeditions were quite well separated, from the Dutch and English on the coast near Painan to our own camp at Sawah Loento, while on the eastern coast of Sumatra Professor TODD occupied the island of Singkep. Over all this portion of the path the rule was cloudy weather, and it is to be regretted that in such an important eclipse as this one, especially in view of the tropical and exceedingly uncertain weather, the stations were not scattered even more widely. The Dutch were quite anxious that some nation should send its expedition to Borneo or Celebes. The conditions here would have been somewhat more difficult, but in no sense dangerous, and a station or two somewhere in this neglected portion of the shadow-path might have saved the day.

LEANDER MCCORMICK OBSERVATORY, Charlottesville, Va.

THE *LEONIDS*—GRAND DISPLAY OF METEORS AT LOWE OBSERVATORY.

BY EDGAR L. LARKIN.

The usual stream of *Leonids* was observed here from midnight until dawn November 15, 1901. The first meteor was seen at 11^h 53^m P.M. on the 14th, before the radiant rose above the peaks

standing sentinel 1,800 feet east of the observatory. The altitude of the observatory is 3,420 feet, and the line of peaks from north to south varies in height above the building from 80 feet in the southeast to 1,340 feet in the northeast; so *Regulus* did not rise until 0^h 49^m November 15th. When the radiant came up alongside of a cliff the rate of meteors was one per minute.

TABLE OF TIMES AND METEORS, NOVEMBER 15, 1901.

Times (P. S. T.)		Number of Meteors.	
From 0 ^h 00 ^m to 1 ^h 00 ^m			32
1 00	1 54	} Cloud before <i>Lco</i>	{ 27
1 54	2 53		
2 43	3		
3 01	4		19
4	5		173
5	5 40		297
			109
Total,			657

Half, or probably slightly less, had trails of all degrees of brilliancy, and in length from 2° to 15°. Four fifths, by estimate, were white, a small number greenish-blue, a few tinged with red, while two were full red. Those leaving streamers were at high speed and seemingly at great altitude; others seemed near the Earth, the small ones not being visible more than half a second.

TABLE OF DIRECTIONS.

From ϵ <i>Hydræ</i>	toward α <i>Columbæ</i> .
<i>Præsepe</i>	ϵ <i>Hydræ</i> .
ϵ <i>Hydræ</i>	β <i>Monocerotis</i> .
<i>Præsepe</i>	γ <i>Leonis</i> .
<i>Præsepe</i>	<i>Procyon</i> .
<i>Regulus</i>	<i>Ursa Majoris</i> .
ϵ <i>Hydræ</i>	<i>Regulus</i> .
<i>Procyon</i>	<i>Sirius</i> .
<i>Castor</i>	<i>Betelguesè</i> .
<i>Sirius</i>	Ocean.
<i>Regulus</i>	<i>Naos</i> .
<i>Procyon</i>	<i>Sirius</i> .
β <i>Monocerotis</i>	<i>Canopus</i> .
β <i>Monocerotis</i>	<i>Naos</i> .
<i>Denebola</i>	<i>Ursa Majoris</i> .
<i>Præsepe</i>	<i>Procyon</i> .
<i>Rigel</i>	West.
<i>Denebola</i>	<i>Canopus</i> .
<i>Rigel</i>	Ocean.
<i>Naos</i>	<i>Canopus</i> .
(Too numerous to record).	

Later—4 A.M. :—

From <i>Leo</i>	toward <i>Arcturus</i> .
Zenith	<i>Arcturus</i> .
<i>Spica</i>	<i>Mercury</i> .
<i>Leo</i>	<i>Mercury</i> .
<i>Denebola</i>	<i>Spica</i> .

These are a selection of the most prominent, all in this table having brilliant trails. The meteor appearing at 3^h 48^m near *Leo* shot to a point midway between *Orion's* head and the *Hyades* with terrific velocity and dissipated into cosmic debris with exceedingly brilliant greenish-blue light, estimated at twenty times the brightness of *Venus* at its maximum. The trail was probably 35' in width and 15° in length. The nucleus disintegrated at π *Orionis*. The trail extended beyond *Betelgeuse*. It remained in the same place for ten minutes, expanding in width to 2°. It then bent at right angles, assumed the shape of the letter F, and slowly widened to a thick **F**. The top bar became detached and floated to *Aldebaran*, where its pearly light went out. The upright widened and lingered 14^m, when it waned and expired. A large meteor, or fire-ball, with splendid streamer emerged from the high east at 4^h 4^m and moved to the shoulder of *Ursa Majoris* with great speed. The nucleus dissolved into intensely brilliant matter and vanished, but the glowing band widened to 1°, bent into the form of the Greek letter Ω and remained in view 6^m. These two were all that had persistent light, none of the others remaining visible more than from half a minute down to the fraction of a second. On November 13, 1833, the *Leonids* put on display at Niagara Falls, and from the accounts written the vision must have been superb. But how is it possible to surpass the unearthly splendor here amid the mountains? The solitude at the midnight hour is supreme, and the silence awful in its intensity. Then fill the expanse of the sidereal vault with shot and shell hurrying in all directions, bursting into brilliant streams here and there, emerging like the swords of marshaled hosts from darkening space,—war without a trace of sound; and the effect is overpowering to brain, sensation, and imagination. Here where the silence at the third hour is so profound that an alert imagery of mind calls up sounds from the cañon's depths and from opposite granite walls,—voices from the unknown in the night,—and where the stillness is so deep that if the axis of the Earth in its turning made sound it would

be heard in this place, unique on earth, a bombardment of *Leonid* meteors is impressive beyond the power of language to portray.

At 1^h 54^m a cloud suddenly condensed round about a summit and obscured *Leo* until 2^h 53^m. A few straggling meteors were seen emerging from the edges, but they were not counted. Omitting these 59^m the rate of fall was 657 meteors in 281 minutes or 2.34 per minute. The fall from 4^h to 4^h 20^m was five per minute, and the highest number seen at once was five. The trend of nearly all was from *Leo* to west and southwest, a limited number going to the north. When *Leo* was well up some appeared to drop into Los Angeles' distant electric sea of lights, others into the ocean, and still others into the gaping mouths of the cañons. All this was due to perspective; none reached the Earth. The mirror of the heliostat was set on the rising point of the radiant and spectroscope adjusted in the hope of securing spectra. None was obtained. No meteor came from the exact radiant. After the cloud dissolved, at 2^h 53^m, all was clear until dawn. And thus passed the memorable shower of *Leonids* of 1901.

LOWE OBSERVATORY, ECHO MOUNTAIN P. O., CAL., Nov. 18, 1901.

PLANETARY PHENOMENA FOR JANUARY AND FEBRUARY, 1902.

BY MALCOLM MCNEILL.

JANUARY.

January, 1902, is not a favorable month for observation of the planets, with the exception of *Mercury* and *Venus*. Several of the others are in the western sky for a short time after sunset, but they are too low down to be easily seen.

Mercury passes superior conjunction with the Sun on January 1st and becomes an evening star, but does not get far enough away to be conspicuous until after the middle of the month. At the end of the month it remains above the horizon about an hour and a half after sunset. It passes *Saturn* on January 6th, *Jupiter* on January 9th, and *Mars* on January 23d. The last named conjunction is rather close, *Mercury* being less than the Moon's diameter south of *Mars*.

Venus is pre-eminently the evening star, remaining above